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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/718,008	11/21/2000	Kenneth Perlin	KPER-4	9323

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EXAMINER	
WANG, JIN CHENG	

ART UNIT	PAPER NUMBER
2628	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/718,008	PERLIN, KENNETH	
	Examiner	Art Unit	
	JIN-CHENG WANG	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 December 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *13-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Applicant's submission filed on 12/04/2010 has been entered. Claims 1-12 have been canceled. Claims 13-16 are pending in the application.

Response to Arguments

Applicant's arguments filed 12/04/2010 have been fully considered but are moot in view of the new ground(s) of rejection set forth in the present Office Action.

Claims 13-16 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 13-16 are also rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

For example, the scope of invention is poorly construed. There is no logical correlation between producing the images with textures and mapping a six bit quantity from last stage L modules. It is too much a jump from mapping to producing and from introducing to mapping. What is the connection between a point in the claimed image and the claimed six bit quantity. There is no logical connection between a point in the image and any quantity in the “mapping”.

Therefore mapping does not result in producing. It thus cannot be said in the claimed step of producing….by mapping. Too many critical elements have been omitted in the claim invention. How could mapping results in producing the images with textures? Moreover, what are last stage L modules? Finally, " six bit quantity" is not well defined and is uncertain as to which six bit quantity applicant is referred to. For the above reasons, the claimed step of producing….by mapping....is not enabled by the Specification. The Specification merely discloses separate steps of producing....and mapping.... Mapping....provides the gradient vectors. However, the gradient vectors are employed to interpolating. Moreover, the claimed six bit quantity s not enabled by the Specification (See Specification at Page 19) as the Specification at Page 19 discloses mapping the lower six bits, as opposed to any six bit quantity. The scope of invention cannot be ascertained.

The claim invention should at least include the following steps:

Introducing information into a computer from which the image is produced;

For each point of the image in 3D geometric space:

Computing a pseudo-random hash value at each vertex of a unit cube surrounding the point of the image using six + modules and seven L modules where the L module is implemented as a look-up table having 64 6 bits entries;

Mapping the lower six bits from last stage L modules of a plurality of stages of modules to a fixed set of 64 gradient vectors where the set is chosen such that a length of each component of every vector of the 64 vectors is a power of two;

Based on the gradient vectors, combining with the computer the contribution from each vertex into a single interpolated result to produce the point of the image with noise interpolated texture that do not have visible grid artifacts; and

After all points of the image are obtained, displaying the image on a display.

Claim Objections

Claim 13 is objected to because of the following informalities: at line 7 of the claim, "graident" should be "gradient". Please also insert "to" before "a fixed set of" at line 7 of the claim. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 13-16 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. As detailed below, a number of steps are critical or essential to the practice of the invention, but not included in the claims. See In re Mayhew, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976).

Claims 13-16 are also rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described

in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

For example, the scope of invention is poorly construed. There is no logical correlation between producing the images with textures and mapping a six bit quantity from last stage L modules. It is too much a jump from mapping to producing and from introducing to mapping. What is the connection between a point in the claimed image and the claimed six bit quantity. There is no logical connection between a point in the image and any quantity in the “mapping”. Therefore mapping does not result in producing. It thus cannot be said in the claimed step of producing….by mapping. Too many critical elements have been omitted in the claim invention. How could mapping results in producing the images with textures? Moreover, what are last stage L modules? Finally, “ six bit quantity” is not well defined and is uncertain as to which six bit quantity applicant is referred to. For the above reasons, the claimed step of producing….by mapping....is not enabled by the Specification. The Specification merely discloses separate steps of producing....and mapping.... Mapping....provides the gradient vectors. However, the gradient vectors are employed to interpolating. Moreover, the claimed six bit quantity s not enabled by the Specification (See Specification at Page 19) as the Specification at Page 19 discloses mapping the lower six bits, as opposed to any six bit quantity. The scope of invention cannot be ascertained.

The claim invention should at least include the following steps:

Introducing information into a computer from which the image is produced;

For each point of the image in 3D geometric space:

Computing a pseudo-random hash value at each vertex of a unit cube surrounding the point of the image using six + modules and seven L modules where the L module is implemented as a look-up table having 64 6 bits entries;

Mapping the lower six bits from last stage L modules of a plurality of stages of modules to a fixed set of 64 gradient vectors where the set is chosen such that a length of each component of every vector of the 64 vectors is a power of two;

Based on the gradient vectors, combining with the computer the contribution from each vertex into a single interpolated result to produce the point of the image with noise interpolated texture that do not have visible grid artifacts; and

After all points of the image are obtained, displaying the image on a display.

Claims 14-16 depend upon the claim 13 and are rejected due to their dependency on the claim 13.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 13-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 13 recites the limitation "the images" in line 3 of the claim. There is insufficient antecedent basis for this limitation in the claim.

Claims 14-16 depend upon the claim 13 and are rejected due to their dependency on the claim 13.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 13-16 are rejected under 35 U.S.C. 102(b) as being anticipated by Ebert, D. et al., July 1998, “Texturing and Modeling; A Procedural Approach”, Second Edition. AP Professional, Cambridge, pp. 209-274 (hereinafter Ebert et al.).

2. Re Claim 13:

Ebert et al. including Perlin, the inventor, the prior art under 102(b), has disclosed an improved Perlin Noise set forth in applicant’s specification. The cited reference discloses a method for creating an appearance of texture in a computer image (see e.g., figures 11-14) comprising the steps of:

Introducing information into a computer from which the images are produced (the C-codes disclosed in Pages 214-218 include each 3 dimensional evaluation of one x, y, z triplet as the same 3D evaluation is taught in the cited prior art. See Page 232-240 for computing the computer textures; for the same reasons set forth above, the images of computer textures are computed in real time because the method steps are taught by the cited references);

Producing the images with texture that do not have visible grid artifacts with the computer by mapping a six bit quantity from last stage L/G modules of a plurality of stages of modules to a fixed set of 64 gradients vectors where the set is chosen such that a length of each component of every vector of the 64 vectors is a power of two (At Page 213-218 the cited reference discloses a point [x, y, z], a point [i, j, k] and [u, v, w]. At Page 214-218 the cited references discloses mapping lattice points [i, j, k] to indices of G, pre-computing a random permutation table P and using this table to fold [i, j, k] into a single n. It also discloses computing the <u>gradients</u> G[P[P[P[I]+j]+k]] wherein the precomputed arrays P and G contain a pseudo-random permutation and pseudo-random unit-length <u>gradient vectors</u> wherein the successive application of P hashes each lattice point to de-correlate the indices into G. The eight linear functions G(x-i, y-j, z-k) are then trilinearly interpolated using the cubic approximation, Page 216.

At Page 213-218 the cited reference discloses a point [x, y, z], a point [i, j, k] and [u, v, w]. At Page 214-218 the cited references discloses mapping lattice points [i, j, k] to indices of G, pre-computing a random permutation table P and using this table to fold [i, j, k] into a single n. It also discloses computing the <u>gradients</u> G[P[P[P[I]+j]+k]] wherein the precomputed arrays P and G contain a pseudo-random permutation and pseudo-random unit-length <u>gradient vectors</u>

wherein the successive application of P hashes each lattice point to de-correlate the indices into G. The eight linear functions G(x-i, y-j, z-k) are then trilinearly interpolated using the cubic approximation, Page 216);

Displaying the image on a display (Page 214-218 of the cited references discloses mapping lattice points [i, j, k] to indices of G, pre-computing a random permutation table P and using this table to fold [i, j, k] into a single n. It also discloses computing the gradients G[P[P[P[I]+j]+k]] wherein the precomputed arrays P and G contain a pseudo-random permutation and pseudo-random unit-length gradient vectors wherein the successive application of P hashes each lattice point to de-correlate the indices into G. The eight linear functions G(x-i, y-j, z-k) are then trilinearly interpolated using the cubic approximation, Page 216. The cited reference discloses an algorithm in Page 214-218 including the 3-dimensional evaluation of one x, y, z triplet. Since the cited reference teaches the identical functionality, thus each 3 dimensional evaluation of one x, y, z triplet requires the identical CPU time when such evaluation is implemented on the same computer. It is readily concluded that the execution speed for the same evaluations of the prior art versus what is claimed require the same CPU time, e.g., on a computer having the same CPU speed. Moreover, the C-codes disclosed in Pages 214-218 include each 3 dimensional evaluation of one x, y, z triplet and therefore meets the claimed *element of "each 3D evaluation of one x, y, z triplet requires only one pipelined clock cycle" as* the same 3D evaluation is taught in the cited prior art. When each 3 dimensional evaluation of one x, y, z triplet for the prior art is exactly the same as each 3 dimensional evaluation of one x, y, z triplet as claimed, the CPU time for each such evaluation by the prior art is equal to the CPU time for each evaluation as claimed. Moreover, it is noted that the C implementation of the

cited reference is very efficient, each 3 dimensional evaluation of one x, y, z triplet requires only one clock cycle, for example, the C code implemented on the Intel optimizing compiler running on a Pentium 2 or 3 computer. The C-codes disclosed in Pages 214-218 include each 3 dimensional evaluation of one x, y, z triplet as the same 3D evaluation is taught in the cited prior art. See Page 232-240 for computing the computer textures; for the same reasons set forth above, the images of computer textures are computed in real time because the method steps are taught by the cited references).

Claim 14:

Ebert further teaches the claim limitation of producing the images with texture in real time (Page 214-218 of the cited references discloses mapping lattice points [i, j, k] to indices of G, pre-computing a random permutation table P and using this table to fold [i, j, k] into a single n. It also discloses computing the gradients G[P[P[P[I]+j]+k]] wherein the precomputed arrays P and G contain a pseudo-random permutation and pseudo-random unit-length gradient vectors wherein the successive application of P hashes each lattice point to de-correlate the indices into G. The eight linear functions G(x-i, y-j, z-k) are then trilinearly interpolated using the cubic approximation, Page 216. The cited reference discloses an algorithm in Page 214-218 including the 3-dimensional evaluation of one x, y, z triplet to produce images with texture in real time. Since the cited reference teaches the identical functionality, thus each 3 dimensional evaluation of one x, y, z triplet requires the identical CPU time when such evaluation is implemented on the same computer to produce images with textures in real time. It is readily concluded that the execution speed for the same evaluations of the prior art versus what is claimed require the same CPU time, e.g., on a computer having the same CPU speed. Moreover, the C-codes disclosed in

Pages 214-218 include each 3 dimensional evaluation of one x, y, z triplet to produce the images with texture in real time. When each 3 dimensional evaluation of one x, y, z triplet for the prior art is exactly the same as each 3 dimensional evaluation of one x, y, z triplet in the prior art to produce the images with textures in real time, the CPU time for each such evaluation by the prior art is equal to the CPU time for each evaluation of the claim invention. Moreover, it is noted that the C implementation of the cited reference is very efficient, each 3 dimensional evaluation of one x, y, z triplet requires only one clock cycle such that the images with texture are produced in real time, for example, the C code implemented on the Intel optimizing compiler running on a Pentium 2 or 3 computer. The C-codes disclosed in Pages 214-218 include each 3 dimensional evaluation of one x, y, z triplet as the same 3D evaluation is taught in the cited prior art such that the images with textures are produced in real time. See Page 232-240 for computing the computer textures; for the same reasons set forth above, the images of computer textures are computed in real time because the method steps are taught by the cited references).

Claim 15:

Ebert further teaches the claim limitation of producing the images with texture based on pseudo-fractal sum (Page 226-229 and Page 232).

Claim 16:

Ebert further teaches the claim limitation of producing the images with texture based on a sine function (Page 216 and Page 229-230 and Page 239-241).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JIN-CHENG WANG whose telephone number is (571)272-7665. The examiner can normally be reached on 8:00 - 6:30 (Mon-Thu).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kee Tung can be reached on (571) 272-7794. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jin-Cheng Wang/
Primary Examiner, Art Unit 2628